

# Emergency and Disaster Response to Chemical Releases

HAZWOPER 29 CFR 1910.120 (q)



## Module 1 Introduction

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## **Acronyms Used in This Module**

ACGIH	American Conference of Governmental Industrial Hygienists
CAA	Clean Air Act
CBRNE	Chemical, Biological, Radiological, Nuclear, Explosive
CERCLA	Comprehensive Environmental Response Compensations Liability Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
DNR	Department of Natural Resources
DOT	Department of Transportation
EOP	Emergency Operations Plan
EPA	Environmental Protection Agency
HAZWOPER	Hazardous Waste Operations and Emergency Response
ICS	Incident Command System
IDLH	Immediately Dangerous to Life and Health
NCP	National Contingency Plan
NIOSH	National Institute of Occupational Safety and Health
NRC	National Response Center
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated Biphenyl
PPE	Personal Protective Equipment
RCRA	Resource Conservation & Recovery Act
RQ	Reportable Quantity
SARA	Superfund Amendments and Reauthorization Act
SCBA	Self-Contained Breathing Apparatus
SOP	Standard Operating Procedures
TSCA	Toxic Substance Control Act
TICs	Toxic Industrial Chemicals
TIMs	Toxic Industrial Materials
WMD	Weapons of Mass Destruction

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## **Overview**

The purpose of this training is to provide knowledge and skills necessary to ensure the safety of response personnel when taking action to contain and control releases of hazardous materials as well as response to disaster events that have impacted the workplace and community. This training will aid employers in compliance with state and federal regulations applicable to spill and disaster response cleanup.

## **Terminal Learning Objective**

Upon completion of this module, the participant will be able to discuss the need for a coordinated response to releases of hazardous substances based upon their employer's plans and OSHA regulations.

## **Enabling Objectives**

Based on the information presented in the classroom and in the participant guide, the participant will be able to:

- Identify hazardous substances.
- Differentiate between an incidental release, an operations level spill, and a hazardous materials release.
- List the ten steps for a safe response to chemical spills.
- Describe the basic operating procedures for a spill response team.

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## Introduction

The United States has acknowledged the potential for terrorism and continues to prepare for terrorist attacks and disaster events in the United States and its territories. The attacks have taught all of us some important lessons. These lessons make it necessary for emergency planners, communities, and all responders *at all levels* to review their preparedness efforts and response capabilities to all types of disaster events. This course will provide training to prepare you for disaster response within your facility and community.

Terrorist activities have and can cause disastrous consequences that will impact all who live or work within the sphere of the event. But several other actions, both natural and intentional, can initiate a similar response at the local level. Therefore, we need to understand that disaster events include more than terrorist activity.

### ***Types of Disasters***

All disaster events and response activities begin at the local level, regardless of what caused the event. Examples of causative agents for disaster events include the following:

- Natural
- Accidental
- Terrorist
  - International
  - Domestic
    - Disgruntled workers
    - Hate groups
    - Cult groups



### ***HAZWOPER***

Hazardous Waste Operations and Emergency Response (HAZWOPER) Title 29 CFR 1910.120 is a regulation that provides responder protection during emergency response cleanup operations where hazardous substances that have been released are removed, contained, neutralized, or processed. The ultimate goal is to ensure that a release area is safe for people and the environment.



The rule is applicable for all emergency and disaster response cleanup operations involving releases of hazardous substances, unless it can be demonstrated that the response does not involve:

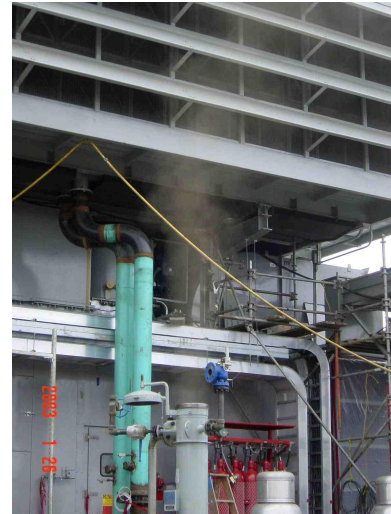
- (1) Employee exposure to the hazardous substances.
- (2) The reasonable possibility for employee exposure to other safety or health hazards.

In the occurrence of a terrorist or disaster incident, similar to 11 September 01 and the Katrina and Rita hurricanes of 2005, OSHA will serve in a technical/advisory capacity rather than an enforcement capacity until the event reverts from crisis management to consequence management.

### ***Workplace Emergencies***

Workplace emergencies can happen at any time and we need to prepare for them. It is hard to think clearly during an emergency and it is essential to plan any response. This training will provide a basic understanding for managing workplace emergencies and establishing an incident management system to effectively and safely respond to emergency and disaster situations.

Understanding that military chemical, biological, radiological, nuclear, and explosive (CBRNE) agents are able to function as weapons of mass destruction (WMD) is critical for industry and community response. We must also realize that these agents are now in the realm of possibility for any individual or group to use as weapons. Although many military agents are difficult to produce and disseminate, alternatives including readily available toxic industrial chemicals (TICs) and toxic industrial materials (TIMs) can and have been used as disaster event initiators.



In the event terrorists use a CBRNE device, or TICs and TIMs, local responders will be on their own for the initial and critical phase of the response. For this reason, responder actions may determine whether the terrorist is successful in causing panic and casualties. The considerations at all levels of response operations are similar in regard to:

- Ensuring personal safety.
- Ensuring safety of other responders.
- Initiating defensive control techniques.

To be effective, standard operating procedures and protocols must be implemented. We will investigate these principals more in later modules.

## Toxic Industrial Chemicals

Hazardous chemicals, hazardous materials, or hazardous substances have long been used for many purposes in homes, business, and industry. Today with the added threat of terrorist activity utilizing these materials as CBRNE agents, the potential for human exposure is even greater.



Terrorists and saboteurs can use chemicals commonly found in communities and industrialized nations to create improvised explosives and chemical agents. Common chemicals may be used because standard military chemical agents may be difficult or dangerous to manufacture, access, or disperse.

Industrial chemicals have been used in several recent incidents. While the improvised chemical agents may be less toxic than military agents, many are perceived to be highly dangerous because:

- They have rapid, highly visible impacts on health.
- They are accessible.
- They can be dispersed by smoke, gas clouds, or food and medicine distribution networks.

### ***Types of Toxic Industrial Chemicals (TICs)***

Some of the more common types of chemicals that could be used in improvised weapons against communities include:

- Eye, skin, and respiratory irritants (acids, ammonia, acrylates, aldehydes, and isocyanates) and choking agents (chlorine, hydrogen sulfide, and phosgene).
- Industrial flammable liquids (acetone, alkenes, alkyl halides, and amines).
- Aromatic hydrocarbons that could be used as water supply contaminants (benzene, etc.).
- Oxidizers for improvised explosives (oxygen, butadiene, and peroxides).
- Aniline and cyanide compounds that could be used as chemical asphyxiates.
- Compressed hydrocarbon fuel gases that could be used as incendiaries or simple asphyxiants (liquefied natural gas, propane, and isobutane).



- Liquid hydrocarbon fuels that could be used as incendiaries or water supply contaminants (gasoline and jet fuel).
- Industrial compounds that could be used as blister agents (dimethyl sulfate).
- Organophosphate pesticides that could be used as low-grade nerve agents.

This is not an all-inclusive list, but it does provide responders with an idea of some of the TICs that can be used as weaponized CBRNE agents, and how they may impact the health and safety of the community.

### ***Sources of Toxic Industrial Chemicals***

"Soft target" sources of chemicals include:

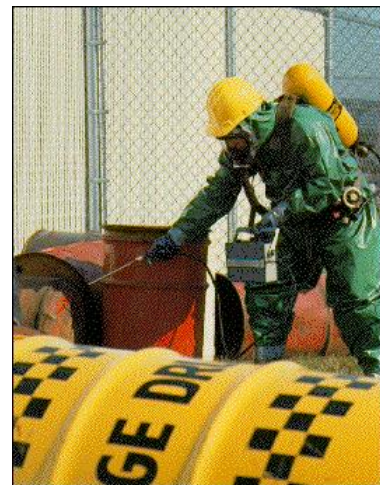
- Chemical manufacturing plants (chlorine, peroxides, industrial gases, plastics, and pesticides).
- Food processing and storage facilities with large ammonia tanks and chemical transportation assets (rail tank cars, tank trucks, pipelines, and river barges).
- Gasoline and jet fuel storage tanks at distribution centers, airports, and barge terminals with compressed gases in tanks, pipelines, and pumping stations.
- Gold mines where cyanide and mercury compounds are used.
- Pesticide manufacturing and supply distributors.
- Educational, medical, and research laboratories.

Industrial chemicals provide terrorists with effective and readily accessible materials to develop improvised explosives and poisons.

### **Hazardous Substances/Materials**

A hazardous substance is any chemical or waste product designated as hazardous by the Environmental Protection Agency (EPA), Department of Transportation (DOT) or OSHA. Exposure to a hazardous substance results or may result in adverse effects on the health or safety of employees. OSHA's regulation for emergency response operations is 29 CFR 1910.120 (q), which applies to all releases or threats of release of hazardous substances without regard to location of the hazard.

Responses to incidental releases of hazardous materials, where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, are not considered to be emergency responses.





The immediate area is the domain where the employee has direct visual contact. If the employee must leave the area to obtain response materials, or if other employees are called for assistance, then OSHA 29 CFR 1910.120(q) covers the response. All spills and releases of transformer oil, gas, or other petroleum products, as well as other hazardous substances, are covered by this regulation.

Consistent with the scope and objectives of 29 CFR 1910.120(q), EPA, and state regulations, your employer should have formulated plans for release prevention and control for spills of hazardous materials. The plans generally recognize that the vast majority of releases will be those designated as “incidental” or non-emergency by the standard. The plan also recognizes that many releases or spills of chemicals, such as petroleum oils, may not pose significant employee exposure or health hazards but do present significant environmental problems.

### ***Releases of Hazardous Substances/Materials***

From a spill team’s standpoint, there are three types of spills or releases of hazardous materials:

1. **Incidental Releases** are incidents that can be handled with spill kits, spill guns, or materials stocked in the immediate area. Workers in the area handle incidental releases within the worksite. The immediate area is domain where the employee has direct visual contact. If the employee must leave the area to obtain assistance or cleanup materials, it is not an incidental release. **29 CFR 1910.120 (q)(6)(i)**



2. **Operations Level Releases** are spills that exceed the department personnel's cleanup capacity; spills that require special personal protective equipment to cleanup; or spills that require special equipment or materials. Operations level spills/releases can be handled safely by employees of the area using proper personal protective equipment (PPE) and training. These spills may be significantly large but not life-threatening and require special equipment not normally maintained in the unit to assist in their spill containment. Operations level personnel respond in a defensive mode and do not come in direct contact with the spilled substance. The Hazmat team could be used in a standby mode at the scene. **29 CFR 1910.120 (q)(6)(ii)**



3. **Hazardous Materials (Technician Level) Releases** are incidents that require the response of a Spill Response team to perform aggressive control techniques to stop a release of a hazardous substance. Team members may come in direct contact with the material and are protected by their personal protective equipment. The team may stop the flow of materials by plugging, patching or otherwise repairing a leak. A leaking chlorine tank, a leaking polychlorinated biphenyl (PCB) oil line on electrical equipment, or a leaking acid tank are examples of an emergency spill team response. **29 CFR 1910.120(q)(6)(iii)**



### ***Technician Level Training***

Spill response team members should receive training sufficient to allow approach to a spill in order to contain, cleanup, or otherwise control the release of the hazardous substance. The objective for providing this training is to impart the knowledge and skills necessary to carefully respond, in a defensive or offensive manner, to a spill incident. The response must ensure that (1) human health, life, and safety are a priority, and (2) the most advanced technology will be applied.

OSHA has established the following skills for response teams in **29 CFR 1910.120(q)(6)(iii)**:

1. Know how to implement the employer's emergency response plan.
2. Know the classification, identification, and verification of known and unknown materials by using field survey instruments and equipment.
3. Be able to function within an assigned role in the Incident Command System.
4. Know how to select and use personal protective equipment (PPE) provided by the employer.
5. Understand hazard and risk assessment techniques.
6. Be able to perform basic control, containment or confinement operations within the capabilities of the resources and protective equipment available.
7. Be able to implement decontamination procedures.
8. Understand termination procedures.
9. Understand basic chemical and toxicological terminology and behavior.

### ***Implementation of Emergency Response Plan***

The purpose of a spill control plan is to provide organized direction for managing a hazardous materials incident and to support a safe response, minimizing hazards to human health or the environment.

At most facilities, if a leak, spill, or release occurs, the individual discovering the incident should attempt to locate and eliminate the source. If possible, one should try to stop or at least contain the release. This can involve closing valves, turning drums upright, activating emergency pumps, using absorbent materials or extinguishing fires.



These measures should only be taken if they can be accomplished without risk to the individual or others. If the source of the release is not immediately obvious or if initial control is not effective or the situation is beyond control, then the discoverer should initiate emergency procedures.

#### ***Ten Steps to a Safe Response***

There are ten steps involved when safely reacting to a hazardous materials spill. These ten steps should be used for all emergency responses to hazardous materials.

- ◆ Get everyone away.
- ◆ Get information on what has been released and about what observers have seen.
- ◆ Get help and inform necessary parties.
- ◆ Seal off the area and alert others.
- ◆ Look for injuries.
- ◆ Identify the hazards.
- ◆ Prepare a plan of action.
- ◆ Obtain equipment and materials.
- ◆ Contain and control the release.
- ◆ Clean up the release.

## **Reporting a CBRNE Event or Release of Hazardous Substances**

### ***CBRNE Event***

Response to a CBRNE or disaster incident must be quick, concise, and effective in order to save and protect lives. Responders must be able to analyze the incident and determine the magnitude of the problem in terms of outcomes and report the situation to local law enforcement.

The responders must also be able to implement the planned response to favorably alter the outcomes consistent with the local emergency response plan and company standard operational procedures. Furthermore, responders must identify the hazards that are associated with an incident involving criminal or terrorist activity.

Responders must also:

- Understand the essentials for CBRNE crime scene preservation and evidence collection.
- Understand the potential for and the effects of secondary devices.
- Be able to identify the phases of a CBRNE incident.
- Be able to perform self-decontamination.

### ***Release of TICs or TIMs***

Spills or unpermitted releases of significant quantities of hazardous substances require notification of federal, state, and local authorities. The notification requirements are mandatory, and failure to report a spill or release when you are required to do so is a criminal as well as a civil offense. Notification of a release may not be used in a criminal case against the person reporting the information, except in prosecution for perjury or for giving a false statement.



### ***Federal Notification***

The National Response Center (NRC) and the Environmental Protection Agency regional office must be notified immediately upon the discovery of a release of a "reportable quantity" (RQ) of a hazardous substance. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) also known as Superfund defines the "reportable quantity". Under Superfund, hazardous substances include:

- All toxic pollutants and hazardous substances listed under the Clean Water Act (CWA).



- Hazardous wastes regulated under the Resource Conservation and Recovery Act (RCRA).
- Any hazardous air pollutant under the Clean Air Act (CAA).
- Chemicals designated as “imminently hazardous” under the Toxic Substances Control Act (TSCA).

Currently there are over 700 chemicals and 1,500 radionuclides with set RQs (40 CFR). CERCLA does exclude crude oil, petroleum products, and natural gas products from reporting, but they are regulated under the Hazardous Substances Pollution Contingency Plan commonly called the National Contingency Plan.

#### *Oil and Petroleum Products*

The National Contingency Plan (NCP) requires any person in charge of a facility (onshore or offshore) who has knowledge of an unauthorized release of oil or a hazardous substance to immediately report the release. A significant release is any amount of product that can or does produce sheens on the surface of water. The reporting requirements are similar to those under CERCLA with the exception that reportable quantity levels are less clearly defined.

#### *The Superfund Amendments and Reauthorization Act (SARA)*

The Superfund Amendments and Reauthorization Act, also known as SARA, expanded the federal reporting requirements to include local and state officials. The SARA legislation also designated a new class of chemicals called Extremely Hazardous Substances. This legislation requires immediate notification of the local emergency planning coordinator or local fire chief and the state upon release of a reportable quantity of a SARA extremely hazardous substance or CERCLA reportable hazardous substance. The report is to include at least:

- Chemical name or identity of substance involved in the releases.
- Whether the substance is listed as an Extremely Hazardous Substance.
- Quantity, time, and duration of the release.
- Media into which the release occurred.
- Known or anticipated acute or chronic health risks associated with the release and applicable medical advice.
- Proper precautions to take in response to the release, including evacuation if appropriate.
- Name and telephone number of person(s) to be contacted for more information.
- A subsequent written follow-up report is also required.

#### **State Notification**

Not all states have mandatory reporting requirements for chemical releases. It is, therefore, essential that individuals check with their respective state for specific reporting requirements.

An example of a state with such a requirement is Iowa. A “hazardous condition” must be reported to the Department of Natural Resources (DNR) and to the local police or sheriff’s office.

In Iowa, a hazardous condition is defined as “any situation involving the actual, imminent, or probable spillage, leakage, or release of a hazardous substance onto the land, into the water of the state, or into the atmosphere, which creates an immediate or potential danger to the public health or safety or to the environment.” Iowa reporting requirements are not dependent on clearly defined reportable quantities. Each situation requires an evaluation of whether it involves a hazardous condition. Any spill of a chemical or petroleum product in the water of the state should be regarded as a hazardous condition and be reported.

Also, consider the requirement that even potential danger might create a hazardous condition under Iowa law. Leakage of a hazardous substance onto the ground may leach into groundwater with time and is considered a potential danger and a hazardous condition.

### ***Disaster and Emergency Response Definitions***

A release of a hazardous substance that requires action of a spill response team is regulated by paragraph (q) of the Hazardous Waste Operations and Emergency Response regulation. The following definitions are pertinent. **29 CFR 1910.120 (a) (3)**

**“Buddy system”** refers to system of organizing employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

**“CBRNE”** is the acronym for Chemical, Biological, Radiological, Nuclear, and Explosive. This term is used in reference to Homeland Security issues.

**“Cleanup operation”** refers to an operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleaned up, or in any other manner processed or handled with the ultimate goal of making the site safer for people or the environment.

**“Decontamination”** refers to the removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects.



**“Emergency response”** or **“responding to emergencies”** refers to an organized response to an incident that does, or may pose, serious physical and/or health threats to personnel or the environment.

**“Hazardous chemical”** is any chemical that poses a physical or a health hazard.

**“Hazardous material”** is any material that has been determined to pose unreasonable risk to health and safety (of individuals) or property when transported in commerce.

**“Hazardous substance”** means any substance designated or listed under paragraphs (A) through (D) of this definition, to which exposure results or may result in adverse affects on the health or safety of employees:



- (A) Any substance defined under section 101(14) of CERCLA;
- (B) Any biological agent and other disease-causing agent as defined in section 101(33) of CERCLA;
- (C) Any substance listed by the U.S. Department of Transportation as hazardous material under 49 CFR 172.101 and appendices; and
- (D) Hazardous waste defined as:
  - (1) A waste or combination of wastes as defined in 40 CFR 261.3 or,
  - (2) Those substances defined as hazardous wastes in 49 CFR 171.8.

**“Health hazard”** refers to a chemical, mixture of chemicals, or a pathogen for which there is statistically significant evidence, based on at least one study conducted in accordance with established scientific principles, that acute or chronic health effects may occur in exposed employees. The term “health hazard” includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins (liver), nephrotoxins (kidneys), neurotoxins (nervous system), agents that act on the hematopoietic (blood) system, and agents that damage the lungs, skin, eyes, or mucous membranes. It also includes physiologic stress due to temperature extremes.

**“IDLH” or “Immediately Dangerous to Life or Health”** is an atmospheric concentration of any toxic, corrosive, or asphyxiate substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects, or would interfere with an individual’s ability to escape from a dangerous atmosphere within 30 minutes.

**“Oxygen deficiency”** refers to the concentration of oxygen by volume below which atmosphere supplying respiratory protection must be provided. It exists in atmospheres where the percentage of oxygen by volume is less than 19.5 percent oxygen.

**“Permissible exposure limit”** means the exposure, inhalation, or dermal permissible exposure limit specified in 29 CFR 1910 Sub-parts G and Z.

**“Published exposure level”** refers to the exposure limits published in National Institute of Occupational Safety and Health (NIOSH), “NIOSH Recommendations for Occupational Health Standards,” dated 1986 incorporated by reference, or if none is specified, the exposure limits published in the standards specified by the American Conference of Governmental Industrial Hygienists (ACGIH) in their publication “Threshold Limit Values and Biological Exposure Indices for 1987-88” dated 1987 incorporated by reference.

**“Post emergency response”** refers to that portion of an emergency response performed after the immediate threat of a release has been stabilized or eliminated and cleanup of the site has begun. If post emergency response is performed by an employer’s own employees who were part of the initial emergency response, it is considered to be part of the initial response and not post emergency response. However, if a group of the employer’s own employees separate from the group providing initial response and perform the cleanup operation, then the separate group of employees would be considered to be performing postemergency response and subject to paragraph (g)(11) of 29 CFR 1910.120.

**“TICs”** is the acronym for Toxic Industrial Chemicals.

**“TIMs”** is the acronym for Toxic Industrial Materials.

### ***Procedures for Handling Emergency Responses***

The following procedures are provided for handling emergency responses during the release of a hazardous substance. These measures provide the minimum basic operating procedures for any spill team response.

**29 CFR 1910.120(q) (3)(ii) - (ix)**

1. Initiate the Incident Command System (ICS) and establish an IC post.
2. Identify, to the extent possible, all hazardous substances or conditions present and conduct a hazard/risk assessment.
3. Designate a safety officer, who is knowledgeable in operations being implemented at the emergency response site, with specific responsibility to identify and evaluate hazards and to provide direction with respect to the safety of operations for the emergency at hand.



4. Based on the hazardous substances or conditions present, ensure that personal protective equipment is used and is appropriate for the hazards to be encountered.
5. Employees engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard will defer to the local fire department or Hazmat team if there is an unknown or identified respiratory hazard and self-contained breathing apparatus (SCBA) is unavailable.
6. Establish zones (exclusion zone, contaminant reduction zone, and support zone).
7. Establish the decontamination corridor.
8. Limit the number of emergency response personnel in the spill area to those who are actively performing emergency operations.  
However, operations in hazardous areas shall be performed using the buddy system in groups of two or more.
9. Backup personnel shall stand by with equipment ready to provide assistance or rescue. Advanced first aid support personnel, as a minimum, shall also stand by with medical equipment.
10. Attempt to limit actions, when possible, to defensive actions that do not bring the employee's personal protective equipment in direct contact with the spilled or released hazardous material.
12. When activities are judged by the safety official to be an IDLH condition or to involve an imminent danger condition, the safety official shall have the authority to alter, suspend, or terminate those activities.
13. After emergency operations have terminated, implement appropriate decontamination procedures.





## Summary

Today we all face new challenges. These new challenges seriously endanger not only the public but those persons whose job is to protect and help the public. The risks faced in today's world pose threats for which the average response community may not be prepared. These threats go far beyond the usual ones associated with residential fires, vehicular accidents, hazardous materials incidents, or weather.

It is critical that response agencies understand the implications of these modern threats and know proper procedures, as well as the limitations of their personnel and equipment. "Safe and cautious" should be the standing orders at any incident. This knowledge will help prevent additional casualties and fatalities at chemical release events. Responders need to translate this knowledge into standard operating procedures (SOP) and emergency operations plans (EOP) written to make safety the paramount consideration. Injured or incapacitated responders are of no help to anyone.

## Review Questions

1. What is the difference between an incidental release and an operations level spill?
2. In general, how can you tell if something is a hazardous substance?
3. Describe how a hazardous substance release should be handled.
4. When is the response to a release of hazardous substances not considered an emergency response?
5. Upon completion of an emergency response, if hazardous substances need to be removed, what options are available?
6. Identify the operating procedures for a spill team response.
7. List the steps to be followed for a safe response to chemical spills.
8. Give examples of IDLH conditions.

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